

Serial No.: 10/607,998
Atty. Docket No.: P68944US0

REMARKS

The Office Action mailed March 29, 2004, has been carefully reviewed and by this Amendment, claim 2 has been canceled, claims 1, 3 and 4 have been amended, and new claims 5-15 have been added. Claims 1 and 3-15 are pending in the application.

The Examiner rejected claims 1-4 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,664,579 to Kim et al. ("Kim").

As set forth in amended claims 1, 3 and 4, the present invention is directed to a method for fabricating a MTJ cell of a MRAM by forming a pinned ferromagnetic layer on a connection layer, forming a tunnel barrier layer on the pinned ferromagnetic layer using a semiconductor film that is a Group IV semiconductor film, and forming a free ferromagnetic layer on the tunnel barrier layer. The Group IV semiconductor film may be preferably a pure Group IV semiconductor film (claim 1), or alternatively may have either Group III elements (claim 3) or Group V elements (claim 4) added thereto for controlling electric conductivity (see the specification at page 7, lines 6-9). This is not shown or suggested by the prior art.

Kim does not disclose forming a tunnel barrier layer with a semiconductor layer that is a pure Group IV semiconductor film. The text at column 7, lines 50-53, only refers to "III-V group magnetic semiconductor *composite* structures" (emphasis added), which means a composite structure of a Group III element and a Group V element. Furthermore, with respect to the adding of Group III or Group V elements to a Group IV semiconductor film, the text of Kim at column 5, lines 59-63, only refers to the implanting of impurities in the semiconductor

substrate 211 to form the source and drain regions. This text does not have any application to the forming of the tunnel barrier layer 217 therein, and no connection with the forming of a tunnel barrier layer using a Group IV semiconductor film as is being claimed by the present invention. Therefore, the forming of the semiconductor layer with a pure Group IV element, as in claim 1, or with a Group IV element to which Group III elements have been added (claim 3) or to which Group V elements have been added (claim 4) is not anticipated by Kim.

Furthermore, the Kim patent is assigned to Hynix Semiconductor Inc., and the present invention is also assigned to Hynix Semiconductor Inc. Accordingly, the Kim patent and the present application are commonly owned by the same company and were commonly owned at the time the present invention was made. Therefore, in accordance with 35 U.S.C. 103(c), the Kim patent is not prior art against the present application for the purposes of an obviousness rejection.

For at least the foregoing reasons, claims 1, 3 and 4 are patentable over the prior art. Claims 5-15 are also allowable as claims properly dependent on an allowable base claim and for the subject matter contained therein. Specifically, the prior art does not teach or suggest a tunnel barrier layer formed using a Group IV semiconductor film having a thickness ranging from 2-20 nm as set forth in claims 5, 7, 9 , 10 and 13. Nor does the prior art teach or suggest forming a tunnel barrier layer using a pure Group IV semiconductor film of Ge (claim 6) or using a pure Group IV semiconductor film of Si (claim 8). The prior art also does not teach or suggest forming a tunnel barrier layer of a Group IV semiconductor film of Ge to which Group III

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elements have been added (claim 11), forming a tunnel barrier layer of a Group IV semiconductor film of Si to which Group III elements have been added (claim 12), forming a tunnel barrier layer of a Group IV semiconductor film of Ge to which Group V elements have been added (claim 14), or forming a tunnel barrier layer of a Group IV semiconductor film of Si to which Group V elements have been added (claim 15).

With the amendments and remarks set forth herein, the application is in condition for allowance. Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early Notice of Allowance.

Respectfully submitted,

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